03. Introduction of mixed effect model

Quantitative Genetics Exercise, Universität Potsdam Dr. Hao Tong

1.   (1) Read the data of wheat hybrids (Ex3.csv), try to draw a scatter plot that soil (x-axis) against yield (y-axis) with different color marked for **sire** groups, and add the regression line for each group, respectively. Are the intercepts and slopes different between sire groups based on the plot? (2) Please answer the same questions in the case of considering **dame** group.

2.   Build the below linear mixed model in R,

$$yield = soil + sire + e,$$

where, soil is fixed effect and sire is the random effect with random intercept only. Write the estimated values for fixed effects and the variance components for random effects, and the corresponding p-values in significance test based on the output in R.

3.   Build the below linear mixed model in R,

$$yield = soil + dame + e,$$

where, soil is fixed effect and dame is the random effect with random slope only. Write the estimated values for fixed effects and the variance components for random effects, and the corresponding p-values in significance test based on the output in R.

4.   Build the below linear mixed model in R,

$$yield = soil + sire + dame + e.$$

Based on the plots in Question 1, which type of random model (random intercept or random slope, with or without relationship) should be used to model sire and dame effect? Write the estimated values for fixed effects and the variance components for random effects, and the corresponding p-values in significance test based on the output in R.